AIM

To verify Stefan's Law of radiation (The law states that the amount of energy radiated through unit time from the surface of a perfectly black body is directly proportional to the fourth power of its absolute temperature.)

PRINCIPLE

The electric power dissipated from a bulb is taken to be proportional to the nth power of the absolute temperature of its filament. The temperature of the filament in turn is directly proportional to the resistance. Hence, by measuring the resistance corresponding to different powers, n can be calculated.

FORMULA

By plotting a graph taking log P along Y-axis and log R along X-axis, the slop of the graph is calculated which gives n.

P = Power dissipated from the BULB (P= VI)

R = Resistance of the filament ($R = \frac{V}{I}$)

V = Voltage across the bulb

I = Current through the bulb.

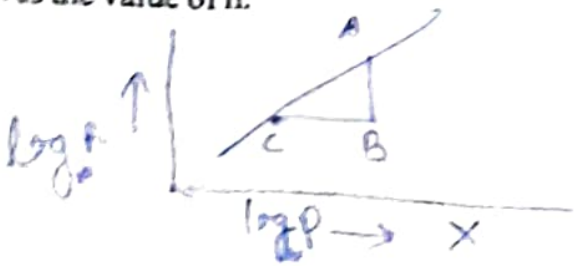
PROCEDURE

The complete circuit diagram is engraved on the front panel. A power supply (built-in), bulb, milliammeter, rheostat and key are connected in series. A voltmeter is connected parallel to the bulb. The circuit is switched on and the rheostatPotentiameter is adjusted till the bulb begins to glow. The voltmeter & milliammeter readings are noted. By adjusting the rheostat, for various values of current, the voltmeter readings are recorded. The power dissipated for each current and the corresponding value of filament resistance are calculated using the relation

P = VI and $R = V/I$ respectively.

A graph is plotted by taking log P along X-axis and log R along the Y-axis. The slop of the straight line graph is calculated which gives the value of n.

RESULT

The value of $n = \frac{AB}{BC}$

Hence, Stefan's Law is verified